UNITED STATES BANKRUPTCY COURT
SOUTHERN DISTRICT OF TEXAS
(Corpus Christi Division)

In re	**§**	**Case No. 05-21207**
	§	
ASARCO, LLC, et al.	**§**	**Chapter 11**
	§	
Debtors	**§**	**Jointly Administered**
______________________________	**§**	

Expert Name: **Joshua Lipton, Ph.D.**
Retention on behalf of: **U.S. Department of Justice**

PROFFER OF DIRECT TESTIMONY OF JOSHUA LIPTON, PH.D.

Introduction

The following information is a true and accurate statement of my testimony if I were called as a witness in open court in this case:

A. Brief Summary of Opinions

1. In this matter, I plan to testify regarding the Natural Resource Damage Assessment ("NRDA") conducted in the Coeur d'Alene River Basin in northern Idaho. I will testify that the procedures followed in assessing the injury to natural resources and damages calculations were sound, and I will present the results of this multi-year effort. Based on the NRDA, damages for injuries to natural resources in the Coeur d'Alene River Basin total at least $333 million, not including the costs incurred by the natural resource Trustees to assess those injuries. Further, based on the overwhelming evidence developed over the nearly 15 years during which I have worked on issues related to the Coeur d'Alene Basin, I will testify that these damages are a conservative estimate of the U.S.' claim in this matter.

B. Expert Qualifications

2. **Education.** I received a Bachelor of Arts degree in environmental biology from Middlebury College, and a Master of Science and Ph.D. in natural resources from Cornell University.

3. **Professional Experience.** I am the CEO and President of Stratus Consulting Inc. I also direct our firm's work in environmental sciences and natural resources, and in NRDA. I also hold an appointment as Research Professor (rank of full Professor) in the Department of

Geochemistry at the Colorado School of Mines in Golden, Colorado. I have served on the editorial boards of two scholarly scientific journals, and served as an appointed expert to the Department of Energy's Center for Risk Excellence.

4. I have over 20 years of professional experience evaluating the effects of contaminants on ecosystems. This experience includes numerous field and laboratory investigations into the effects of metals on organism health, viability, behavior, and population status. I am the author or coauthor of over 45 peer-reviewed scientific publications and over 100 scientific presentations at national and international meetings. The majority of these publications address the environmental effects of metals. For example, my published work includes peer-reviewed studies that examine the bioavailability of metals to trout and salmon, the effects of metals on trout when administered via their diets, the effects of metals on trout and salmon behavior, the sensitivity of bull trout to metals, and the effects of metals on riparian and upland forest vegetation and wildlife habitat. I have performed detailed investigations into the environmental effects of metals at many hard rock mine sites throughout the U.S. and internationally. In addition to my work with metals and mine sites, I also have considerable experience evaluating the environmental effects of organochlorine and petroleum contaminants.

5. I have worked on over 60 individual NRDAs throughout the U.S., including at the Coeur d'Alene Basin in Idaho, the California Gulch Site in Colorado, the Clark Fork River Superfund Site in Montana, and many other mining and non-mining sites. In addition to my work on these individual NRDAs, I have assisted in the development of Federal NRDA regulations and guidance, and have served as an instructor at Federal and State NRDA training courses. I

also am currently working on the development of analogous methods and technical guidance for the European Union pursuant to their Environmental Liabilities Directive.

6. My NRDA work has involved numerous field, laboratory, and literature-based assessments to determine the nature and extent of injuries to natural resources, to quantify baseline conditions, to quantify damages using habitat and resource equivalency methods, and to design and plan restoration projects. I have been qualified as an expert in natural resource damage assessment (and environmental toxicology) in U.S. Federal Court.

7. I have personally been involved in working on the Coeur d'Alene Basin NRDA for more than 15 years. Over that period of time, my work has included designing and conducting field studies, designing and conducting laboratory studies, evaluating published and unpublished literature, conducting analyses of environmental data, evaluating restoration options, and calculating natural resource damages. I coauthored the Report of Injury Assessment and Determination, several peer-reviewed journal articles related to work performed in the Basin, and authored a number of expert reports for both phases of the litigation, as well as for this bankruptcy process.

C. Natural Resource Damage Assessment

Background

8. Actions for natural resource damages seek to make the public whole for injuries suffered by natural resources in the public trust. The Trustees for those natural resources – the U.S., States, or Indian Tribes – are entitled to full compensation to restore those natural resources to their "baseline" condition, as well as for the loss of services provided by the injured resources.

Baseline, which will be discussed more particularly below, is the physical, chemical, and biological condition the injured resources would have been in if the release of hazardous substances had not occurred. See 43 CFR § 11.14(e).

9. Natural resource Trustees are required to use damages recovered under CERCLA to restore, replace, or acquire the equivalent of the injured resources [43 U.S.C. § 9607(f)(1)].

10. Natural resource damages are sought by Trustees as compensation for harm caused to natural resources by releases of hazardous substances. Natural resource damages are different from remedial cleanup, or response, costs incurred by response agencies such as the U.S. Environmental Protection Agency (EPA) and its State counterparts. Under the Superfund statute, the response agencies address releases of hazardous substances by taking actions to control ongoing risks to human health or the environment. The Trustees then can seek damages to compensate the public for past, ongoing present, or expected future harms to natural resources. Therefore, natural resources damages are different from, and supplemental to, remedial cleanup or response costs. Moreover, the Trustees have the obligation of ensuring that their assessments of damages consider the influence of any remedial cleanup actions.

11. The U.S. Department of the Interior (DOI) has promulgated regulations for conducting NRDAs under the Superfund Act. These regulations are found at 43 CFR Part 11. The application of these regulations is not mandatory, and natural resource Trustees have the option of diverging from them as appropriate [43 CFR § 11.10].

12. The key steps in performing NRDAs include determining the nature of hazardous substance releases into the environment; the nature of exposure of natural resources to those

hazardous substances that have been released; and the nature, extent, and quantity of injuries to natural resources. The last step is to quantify damages associated with the injuries to natural resources. These key steps are described in the DOI regulations.

13. In my experience, it is routine and common for natural resource Trustees to seek methodological guidance from the DOI regulations without applying each and every administrative element of the regulations. For example, Trustees often rely on guidance and criteria outlined in the DOI regulations in assessing natural resource injuries [43 CFR § 11.62], determining transport pathways [43 CFR §11.63], and evaluating baseline conditions [43 CFR § 11.70(a); 43 CFR § 11.72]. The approaches I used to calculate natural resource damages at the Coeur d'Alene Basin Site, including determining and quantifying injuries to natural resources, and calculating the costs of restoration, replacement, and acquisition of services, are consistent with the DOI regulations and standard practices for NRDA.

14. As stated in the DOI regulations, "the measure of damages is the cost of restoration, rehabilitation, replacement, and/or acquisition of the equivalent of the injured natural resources and the services those resources provide" [43 CFR § 11.80 (b)]. In addition, the regulations indicate that Trustees can seek damages for lost services from the onset of injury until natural resources and their services have been restored to baseline conditions. In other words, there are two components of natural resource damages: (1) the restoration of injured resources and their services to baseline conditions, and (2) compensatory restoration to account for lost services in the past, present, and future until the natural resources have been restored to baseline conditions.

15. The primary approach I used to calculate natural resource damages involves determining the costs of restoration, replacement, rehabilitation, or acquisition actions[a] needed to compensate for past, ongoing, and future injuries to natural resources. Past damages refer to damages incurred starting in 1981, following passage of the Superfund statute in December 1980. Ongoing damages refer to damages that are ongoing now. Future damages refer to damages that will occur in the future and are residual to any remedial actions that will be performed at the site. This approach is outlined in the DOI regulations and is used routinely by Trustees at sites throughout the U.S.

16. A commonly used approach to calculating restoration costs is Habitat Equivalency Analysis [HEA; also known as Resource Equivalency Analysis (REA)]. This method has been published in peer-reviewed literature, has been codified in the U.S. National Oceanic and Atmospheric Administration's (NOAA's) regulations for NRDA, have been accepted by U.S. Courts [United States v. Melvin A. Fisher et al., Case No. 92-10027-CIVIL-DAVIS; United States v. Great Lakes Dredge and Dock Co., 259 F. 3d 1300, (11th Cir. 2001)], and is routinely performed at natural resource damage sites throughout the U.S.

17. I have performed HEA analyses at dozens of sites throughout the U.S. and have published several peer-reviewed articles on HEA. The technical approach for HEA is presented in a series of published articles (e.g., NOAA, 2000; Strange et al., 2002; Cacela et al., 2005; Allen et al., 2005). As I noted previously, the European Union also has embraced this approach in its Environmental Liabilities Directive. HEA methods also have been used by the United Nations Compensation Commission in determining environmental claims.

[a] Henceforth I will use the term "restoration" to encompass all of these terms.

18. Conducting a HEA involves three main steps: (1) quantify the effects of environmental harm in terms of the extent and degree of lost resources or services, (2) identify and evaluate restoration options in terms of the quantity and quality of service or resource enhancement anticipated to be provided, and (3) scale the restoration to compensate for the lost resources or services over time. Damages then are determined by calculating the costs of implementing the restoration actions at the scale necessary to compensate for losses. All restoration costs are calculated using standardized and accepted procedures of discounting to calculate present values. That is, using a discount rate, past damages are represented in present value terms by applying a multiplier, whereas future damages are discounted to present value terms. Because of this discounting process, future damages are worth less, in present value terms, than past or current damages. The further into the future the discounting is applied, the lower the present value of the discounted damages.

The Coeur d'Alene Basin Natural Resource Damage Assessment

19. The Coeur d'Alene Basin NRDA was undertaken by the U.S. (specifically, the U.S. Fish and Wildlife Service, the U.S. Bureau of Land Management, and the USDA Forest Service) and the Coeur d'Alene Tribe. The Trustees initiated their NRDA in 1991 in response to information about substantial natural resource injuries caused by releases of hazardous substances from mining and mineral processing operations. Over the course of the past 15 years, the Trustees have completed a number of regulatory decision documents, including a preassessment screen and determination, an assessment plan, and a report of injury assessment and determination. The Trustees also completed a full determination and quantification of injury, which was presented at trial in Federal Court in 2001. Following the Court's ruling that natural

resources had been injured in the Coeur d’Alene Basin, the Trustees proceeded toward completion of a quantification of damages.

20. The Coeur d’Alene Basin NRDA is the largest and most comprehensive NRDA undertaken by the U.S. Over the more than a decade of intensive study, the U.S. and Coeur d’Alene Tribe have performed detailed analyses of hazardous substance sources and pathways and of injuries to natural resources such as water, sediments, fish, benthic invertebrates, birds, vegetation, and wildlife habitat. Those studies have resulted in numerous peer-reviewed scientific publications. The studies performed by the Trustees and the conclusions regarding injuries to natural resources were summarized in the voluminous Report of Injury Assessment and Determination. That document was admitted as evidence in the first phase of the trial and was adopted by Trustee agencies as a formal decision document.

21. Following the first phase of the trial, the Court concurred with the Trustees in finding that multiple natural resources had been injured by releases of hazardous substances from mining and mineral processing operations. Among other things, the Court found that surface water was injured, by virtue of the regular and substantial exceedences of water quality criteria promulgated for the protection of aquatic life. The Court also found that fish had been injured, as shown by toxicity testing and evidence of population reductions; that tundra swans had been injured, as evidenced by the numerous tundra swan mortalities observed in the Basin; and that riparian soils, vegetation, and supporting habitats had been injured on Federal lands, as demonstrated by toxicity tests and field evidence showing substantial devegetation of contaminated lands.

22. Based on the Federal Court’s ruling, the Trustees proceeded to quantify natural resource damages for those natural resources determined by the Court to have been injured. As a

result, the Trustees completed damage determination studies for surface water, fish, tundra swans, and Federal lands.

D. The Calculation of Damages

Approach to Damage Calculation

23. The Trustees used three basic approaches to calculating damages. Each of these approaches is described in the DOI regulations for performing damage assessment. As stated in those regulations, “the measure of damages is the cost of restoration, rehabilitation, replacement, and/or acquisition of the equivalent of the injured natural resources and the services those resources provide” [43 CFR § 11.80(b)]. In addition, the regulations indicate that Trustees can seek damages for lost services from the onset of injury until natural resources and their services have been restored to baseline conditions. In other words, there are two components of natural resource damages: (1) the restoration of injured resources to baseline conditions, and (2) the compensatory restoration to account for lost services in the past, present, and future until the natural resources have been restored to baseline.

24. Consistent with the DOI regulations, the natural resource damages calculated by the Trustees included several alternatives, including the cost of restoration, the cost of acquisition, and service replacement costs (Lipton et al., 2004a, p. 6-9).

Summary of Natural Resources Damages at the Coeur d'Alene Site

Calculations from 2004 Expert Report

25. In my expert report of 2004 (Lipton et al., 2004a), I provided a summary of natural resource damages for the Coeur d'Alene Site. In that summary, I showed that restoration cost estimates range from $143.7 million to $839.5 million.[b] The low estimate does not actually represent total damages because it represented a "management alternative" under which hazardous substances would be managed, in place, but natural resources would not be restored.

26. I also estimated damages for aquatic resources based on service replacement costs and on acquisition costs. Service replacement costs employed the REA approach I have described previously. The acquisition approach is a straightforward method in which we calculated the cost to acquire water of a similar volume to that which was injured. This is analogous to determining the cost to acquire a replacement vehicle if your car is damaged. Using the resource equivalency approach, I calculated damages to aquatic resources ranging from $64.4 million to $192 million. Using the acquisition approach, damages to aquatic resources ranged from $302.7 to $329.8 million.

27. My 2004 expert report also described damages to Federal lands as ranging from $59.7 to $104 million using equivalency approaches, and $92.8 million for on-site restoration. Finally, the summary report presented damages to injured tundra swans that had been calculated by Trost (2004) using a mixture of on-site restoration and resource equivalency approaches. Those damages equaled $183.5 million.

[b] All damages in the Lipton et al (2004a) report are presented in 2004$.

28. On November 9, 2004, I submitted a supplemental expert report addressing certain aspects of the natural resource damage calculations. Specifically, I updated calculations to address the potential overlap in aquatic and riparian services that could be generated from implementing some of the restoration actions described in the earlier expert reports. I also updated the costs to conduct riparian habitat restoration actions. The revised range of damages was \$58.2 to \$101 million, a very slight decrease from the initial values.

29. Because the Trustees used several different approaches to calculating damages, total natural resource damages also can be calculated several ways. Table 1 presents alternative approaches to calculating total damages based on my 2004 report. Each of the methods presented in Table 1 is an appropriate approach to calculating damages. The on-site restoration approach is the most expensive of the three methods because the amount of effort required to restore the grossly injured habitats of the Coeur d'Alene Basin is extremely costly. This approach also is the only method that will truly restore injured natural resources to something approaching baseline conditions. The service replacement approach, in which habitat and resource equivalency methods were used to calculate the cost of restoring other natural resources as compensation for the injuries in the Coeur d'Alene Basin, is the least expensive approach. This approach is commonly used by Trustees around the U.S. (and internationally) to calculate natural resource damages. Although the off-site restoration actions that will be undertaken using this approach are scaled to compensate for the extensive on-site injuries, the approach will not make the injured environment whole. In fact, total damages at the site are equal to the costs of primary restoration *plus* the costs of compensatory service replacement (Method 1 *plus* either Method 2 or Method 3; but taking into account any overlap in restoration actions and subtracting those costs

from the total).[c] As a result, I concluded that natural resource damages for the Coeur d'Alene Superfund Site were at least $304 million, as calculated in 2004$.

Table 1. Alternative approaches to calculating total natural resource damages from individual damage components

Cost component	**Damages (2004$)**
Method 1: On-Site Restoration Approach	
Comprehensive restoration	$839.5 million
Staged restoration	$643.5 million
Restoration of Federal lands + Coeur d'Alene Lake management	$382 million
Range: $382 – $839.5 million	
Method 2: Water Acquisition + Federal Lands + Swans	
Water acquisition	$302.7 – $329.8 million
Federal lands (service replacement)	$58.2 – $101 million
Swans (service replacement and habitat restoration)	$183.5 million
Range: $544.4 – $614.3 million	
Method 3: Service Replacement (sum of all)	
Aquatics	$69.5 – $192 million
Federal lands	$58.2 – $101 million
Swans	$183.5 million
Savings through riparian restoration	($7.2 – $12.5 million)
Range: $304 – $463 million	

Updated Calculations: 2007 Expert Report

30. In my expert rebuttal report of 2007, I updated my original damage calculations. First, I updated the damage calculations to 2008$. I also correctly incorporated discounting to account for both the time value of money and escalations in restoration costs. In addition, I recalculated

[c] For example, there are certain similar restoration actions described in the comprehensive restoration alternative of Method 1, and the swan restoration projects in Methods 2 and 3. I did not attempt to separate out potentially overlapping projects to develop a true total cost of primary restoration and compensatory service replacement.

damages to aquatic resources and Federal lands to incorporate the influence of EPA's proposed comprehensive cleanup, as described in the expert report of Grandinetti (2007).

31. Table 2 updates the analysis originally presented in 2004$. As shown in the table, total damages using the service replacement approach, are $333 million in 2008$.

Table 2. Total natural resource damages using the service replacement approach assuming implementation of the interim remedy (damages updated to 2008$)

Resource	Damages in 2008$
Aquatics[a]	$68.4 million
Federal lands[b]	$68.2 million
Swans	$209.6 million
Savings through riparian restoration[c]	($8.2 million)
Prior settlements	($4.78 million)
Total	**$333.2 million**

a. Based on road relocation alternative in Ninemile and Canyon creeks and large woody debris addition in the South Fork Coeur d'Alene River (SFCDR), 10-year implementation.
b. Based on road removal alternative.
c. Savings are achieved because of riparian benefits realized by implementation of aquatic replacement projects as described in Lipton et al. (2004b).

32. In addition to updating our prior estimates to 2008$, I also developed calculations of total natural resource damages assuming implementation of EPA's comprehensive cleanup approach, as presented in Grandinetti (2007). According to Grandinetti (2007) and URS Greiner and CH2M Hill (2001), the comprehensive cleanup approach specifies remedial projects for Ninemile Creek, Canyon Creek, and the SFCDR over a 20-year period from 2008 to 2027. Because the extent and timing of conducting a comprehensive cleanup differs from the interim remedy presented in the Record of Decision (U.S. EPA, 2002), the magnitude and timing of natural resource damages will also differ. Damages are reduced by the ecological benefits of additional remediation, but increased by collateral natural resource injuries that will occur as a

result of implementation of the remedy. Table 3 summarizes damages using the service replacement approach, assuming implementation of the comprehensive remedy.

Table 3. Total natural resource damages (2008$) for aquatic resources and Federal lands for the comprehensive remedy using the service replacement approach

Aquatics[a]	$64.0 million
Federal lands[b]	$95.8 million
Savings through riparian restoration[c]	($12.7 million)
Swans	209.6 million[d]
Prior settlements	($4.78 million)
Total	**$351.9 million**

a. Based on road and rail bed relocation alternative in Ninemile and Canyon creeks and wood addition in the SFCDR, 10-year implementation.
b. Based on road bed removal alternative.
c. Savings are achieved because of riparian benefits realized by implementation of aquatic replacement projects as described in Lipton et al. (2004b).
d. Updated to 2008$; not updated to address comprehensive remedy.

<u>Recent Revisions to my Calculations</u>

33. When my deposition was taken on September 7, 2007, I was asked about information contained in a rebuttal report prepared by Mr. James Chadwick. That report referred to fish population data collection in 2005 by the State of Idaho that reported the presence of cutthroat trout in Canyon Creek. I had been surprised by this reference because Canyon Creek has been so contaminated that it has not supported fish in the past. Following my deposition, I decided to follow up on this question, and proceeded to work with the U.S. Fish and Wildlife Service and USDA Forest Service to conduct fish population sampling in Canyon Creek. Operating under a fish collection permit held by the Forest Service and a written sampling plan, agency personnel and my staff performed a population survey in Canyon Creek on Tuesday, September 25. Somewhat to my surprise, the data we collected confirmed the State of Idaho's data: we found a number of trout in Canyon Creek.

34. We sampled a total of five stations. Two of the stations were upstream of the Burke Mill, the point at which the creek shows obvious signs of mine waste impacts. These stations served as upstream reference locations. We also sampled three stations downstream of the Burke Mill. The first station was about 300 meters downstream of the tunnel at the mill (Canyon Creek runs through a tunnel below the mill for several hundred meters. The second station was between Black Bear and Frisco, roughly halfway between the Burke Mill and the Star Tailings complex. The third station was located in the lower third of Canyon Creek towards the upstream portion of the Star Tailings complex.

35. At the most upstream reference station, we collected a relatively large number of trout of various species. Total population densities at that site were approximately 17 trout per 100 square meters. At the reference station immediately upstream of Burke, trout densities were much lower (only about 3 trout per 100 square meters). However, the fish population at that station was characterized by large numbers of sculpin, a native fish species that is metals-sensitive and non-migratory. Including the native sculpin in the population estimates yielded a total fish density of about 11 fish per 100 square meters. This value is a minimum density because we did not observe depletions in sculpin during our successive electrofishing passes. Therefore, the total number of fish at this location is likely to be higher.

36. We also found fish at all the downstream locations. The most upstream of those locations, just downstream of Burke, had cutthroat trout at a density of about 12.7 fish per 100 square meters. The next sampling station downstream, near Frisco, also had cutthroat trout, with a density estimate of at least 7.4 fish per 100 square meters. However, this is a minimum density estimate because field personnel were not able to complete a third electrofishing pass at

that station, and this estimate is likely too low. Therefore, I have assumed that the trout density at that station was also 12.7 trout per 100 square meters. At the most downstream location, adjacent to the Star Tailings, trout densities were much lower, with only 1.7 trout per 100 square meters. No sculpin were found at any site downstream of the Burke Mill.

37. Based on the results of this sampling, I made several changes to my damage estimates. The first adjustment I made was to increase the number of trout from zero – the levels I had previously assumed – to the densities we measured on September 25. I assumed a constant density of 12.7 trout per 100 square meters in the upper half of lower Canyon Creek. I then assumed a constant density of 1.7 trout per 100 square meters for the lower portion of Canyon Creek.

38. I assumed that trout populations increased linearly from zero in 1998 to current levels. I selected 1998 because that is when the Silver Valley Trustees completed remediation work in Canyon Creek.

39. I also adjusted the baseline fish densities in my calculations. In my earlier analyses, I had used a very conservative baseline estimate of 5.5 trout per 100 square meters. The current sampling clearly shows that the baseline is at least as much as the current density, or about 12.7 trout per 100 square meters. That value is likely too low, because improvements to water quality and riparian habitat would result in an increase in trout densities. As an alternative measure of baseline, I used data from the upstream sampling location that had densities of 17.5 trout per 100 square meters. That value may be somewhat high, because the habitat in the headwater areas is relatively pristine. However, these two values comprise a reasonable range of baseline conditions.

40. When I recalculated damages for Canyon Creek, damages increased from my prior estimates to a range of $22.1 – $31.9 million (based on the least cost restoration alternative of road relocation). The reason that damages increase, even though we found more fish than expected in Canyon Creek, is that my initial calculations had assumed a highly conservative – and clearly incorrect, as shown from recent sampling – baseline condition. Because the baseline condition was adjusted upwards, the total amount of injury to trout increases, resulting in a concomitant increase in damages. Table 4, below, presents these most recent calculations and shows that total damages range from $358 to $367.8 million.

Table 4. Total natural resource damages (2008$) for aquatic resources and Federal lands for the comprehensive remedy using the service replacement approach, updated to include 2007 Canyon Creek fish sampling data

Aquatics[a]	$70.1 – 79.9 million
Federal lands[b]	$95.8 million
Savings through riparian restoration[c]	($12.7 million)
Swans	209.6 million[d]
Prior settlements	($4.78 million)
Total	**$358 – 367.8 million**

a. Based on road and rail bed relocation alternative in Ninemile and Canyon creeks and wood addition in the SFCDR, 10-year implementation.
b. Based on road bed removal alternative.
c. Savings are achieved because of riparian benefits realized by implementation of aquatic replacement projects as described in Lipton et al. (2004b).
d. Updated to 2008$; not updated to address comprehensive remedy.

E. Other Issues Raised by Debtors

41. In their various expert reports, debtors have raised several issues regarding our damage calculations. The primary issues that they have raised that influence the calculation of damages are: (1) that conservation easements should be adopted as the least cost restoration alternative for the Federal lands damage determination; (2) that our damage assessment

employed baseline conditions that were incorrect and artificially inflated, particularly for aquatic resources; (3) that our injury quantification for surface water employed incorrect water quality standards; and (4) that the restoration costs we employed to calculate damages were too high. None of the evidence regarding injuries in the Basin supports these contentions.

Conservation Easements as Least Cost Restoration Alternative

42. In his expert reports, Mr. Richard White has argued that conservation easements with natural recovery, one of the restoration alternatives we considered, should be used as the basis for calculating damages to Federal lands because it is the most cost effective alternative. This came up a number of times in my September 7 deposition.

43. I agree that, *all other things being equal*, cost-effectiveness should be applied to select restoration alternatives. However, cost-effectiveness should only be applied when all other benefits of the restoration projects are *equivalent*. Moreover, cost-effectiveness is not determined by simply selecting the alternative with the lowest capital cost. Trustees may select "higher cost" alternatives under many different scenarios, such as when:

- The ecological or human use benefits of a "higher cost" project are greater
- The restoration to be achieved by the "higher cost" project represents a better nexus to the injury and therefore more fully restores the injured resource or service
- The likelihood of project success is greater for the "higher cost" project
- The longevity of the "higher cost" project is greater

- A mixture of projects is deemed more desirable than a single type of project (e.g., because of issues of nexus, likelihood of success, scale).

44. The DOI regulations specifically identify the following factors as being relevant to the Trustees' evaluation of restoration alternatives:

- Technical feasibility

- The relationship of the expected costs of the proposed actions t*o the expected benefits from the restoration, rehabilitation, replacement, and/or acquisition* of equivalent resources (emphasis added).

45. The regulations also state that "A Federal authorized official *shall not select an alternative that requires acquisition of land for Federal management* unless the Federal authorized official determines that restoration, rehabilitation, and/or other replacement of the injured resources is not possible." (emphasis added)

46. Considering the factors described above, we concluded that the conservation easement with natural recovery alternative was not the appropriate measure of damages because it would not provide appropriate ecological benefits, was not institutionally desirable, and therefore was infeasible. This is supported by the declarations of Mr. Dave Fortier of the U.S. Bureau of Land Management (BLM) and Mr. Jeff Johnson of the USDA Forest Service. Those individuals, who are Trustee representatives with direct responsibility for management of Federal lands in the Coeur d'Alene Basin, indicate that conservation easements with natural recovery are neither desirable, administratively acceptable, nor likely to provide benefits to trust resources in a manner that is consistent with the management authorities of the agencies.

47. Further, Mr. Johnson of the U.S. Forest Service met with a member of my staff on September 25 and toured the North Fork of the Coeur d'Alene Basin to observe opportunities for development of easements on private properties. At that site visit, it was evident that the easement with natural recovery alternative is not feasible.

48. As I stated in my deposition testimony, the most cost-effective restoration alternative is road removal with subsequent revegetation. Mr. Johnson confirmed during the September 25 site visit that this alternative was desirable, feasible, and consistent with National Forest management policies and actions.

Use of Inflated Baseline

49. Debtors experts, in particular Mr. James Chadwick (similar issues are raised in Dr. Desvousges' rebuttal report filed on behalf of Asarco, Inc.), have contended that our baseline conditions are artificially inflated, thereby resulting in overestimates of damages. In particular, Mr. Chadwick suggests that our selection of baseline conditions did not properly account for non-mining factors that can limit fish populations.

50. Baseline conditions for aquatic biota were determined by measured fish populations upstream of primary sources of mine wastes in the three assessment streams: Canyon Creek, Ninemile Creek, and the South Fork Coeur d'Alene River (SFCDA). Use of upstream reference conditions to determine baseline is identified as one of the preferred approaches in the DOI NRDA regulations. These measurements provide a straightforward means of contrasting resource conditions up- and downstream of contaminant sources.

51. Debtor has argued that our upstream reference locations in Canyon and Ninemile creeks have higher quality habitat than the downstream assessment reaches. This is correct, but only serves to confirm that the upstream reaches are the appropriate sites at which to determine baseline. The impairment of aquatic habitat in the affected portions of those two creeks is visually obvious. This impairment is primarily caused by the extensive injuries to riparian vegetation which are a direct result of the mining companies' releases of waste. Those riparian injuries are the subject of the analysis in the U.S.' calculation of damages for injuries to Federal lands. Thus, to suggest that the fisheries baseline should have a similar degree of resource injury completely ignores the fact – consistent with the findings of the District Court – that the defendants were the cause of the habitat degradation, and would involve improperly giving "credit" to debtors for the injuries they caused.

52. Debtor has also argued that our upstream reference areas in SFCDA were not subject to the same degree of channelization as the assessment reach in the lower SFCDA. Several pieces of evidence argue against this conclusion. First, upstream reference areas are also channelized; in many locations, quite heavily. Dr. Frank Rahel showed that upstream reference areas were as highly channelized as downstream assessment areas. Moreover, Dr. Rahel showed that trout populations were not correlated with percent channelization; therefore differences in channelization would not explain the dramatic decrease in trout populations in the downstream contaminated areas. Our recent fish sampling in Canyon Creek demonstrated a similar absence in relationship between channelization and trout populations. Moreover, trout population recoveries in Canyon Creek have been associated with decreases in metals populations, not with improvements in habitat quality. The studies conducted as part of the NRDA, together with the

expert testimony presented in the District Court litigation, overwhelmingly agree that metals are the primary source of injury to fish populations in the South Fork Coeur d'Alene River.

53. Finally, it should be pointed out that the upstream reference area in the SFCDA are not only subjected to various non-mining effects such as channelization and road construction, those areas also contain measurable quantities of mining-related hazardous substances. In studies performed in the mid-1990s, metals concentrations were sufficiently high to cause approximately 30% mortality to cutthroat trout placed in the upstream areas in livebox tests. These studies showed that our selection of an upstream reference condition to characterize baseline may have been overly conservative, resulting in an underestimate of damages.

54. Mr. Chadwick has also argued that our baseline values are inflated because they average several years' worth of data, and that the multi-year average is biased by the relatively large number of samples collected in 1998. It is correct that our comparison of relative densities in the assessment and reference reaches pool data collected across four years. It is also correct that we have more assessment area samples from 1998 than the other years. It is incorrect, however, that this resulted in inflated estimates of trout injury. The ratio of trout densities in reference areas compared to assessment area reaches in our calculations was 5.9:1 (that is, there were, on average, about 6 times more trout in upstream reference areas than in downstream contaminated areas). Had we made these comparisons on an annual basis by only contrasting data collected within the same year by the same investigator, the ratios would have been 16.2, 1.7, 19, and 6.4; the average of these four values is 10.8. That is, in three of the four years of sampling, as well as in the average of the four within-year comparisons, the relative trout densities were higher than the value that we used in our calculations (5.9), in many cases by a

considerable degree. Clearly, our use of multi-year averaging did not result in our damage estimates being inflated; if anything, our method resulted in an understatement of injuries and damages.

55. Mr. Chadwick also has argued that we should have used reference data from the St. Regis River, instead of using upstream SFCDA as the measure of baseline. We did not select the St. Regis River as our measure of baseline because we did not feel that the comparison was as straightforward or scientifically defensible as the SFCDA comparison. It is true that the St. Regis is influenced by a number of non-mining stressors such as I-90 construction and channelization. However, the same conditions apply to the upper SFCDA, as I stated above. Had we selected the St. Regis as our reference area, relying on the study performed by Reiser in 1996, the relative trout density of the St. Regis sites to the matching assessment area sites in the SFCDA was 14:1. This would have caused our injury estimates to have been larger, not smaller.

<u>Use of Incorrect Water Quality Criteria to Quantify Surface Water Injuries</u>

56. Mr. Chadwick, on behalf of debtors, has argued that we used incorrect water quality criteria to determine and quantify injuries to surface water resources.[d] Our injury analysis relied on the Federal water quality criteria for protection of aquatic life that were in force at the time of our analysis. Since that time, the State of Idaho has promulgated site-specific water quality criteria for the SFCDA. Those site-specific criteria result in water quality standards for zinc being increased from the Federal criteria we used in our analyses, approximately by a factor of two. Water quality standards for cadmium, however, were slightly decreased from the values that

[d] This argument primarily pertains to the surface water acquisition analysis, not the fish-based resource equivalency analysis. Injuries were determined and quantified to aquatic biota using measured changes in fish populations, not based on exceedences of water quality criteria and standards.

we used. Therefore, for cadmium, the frequency and extent of exceedences of water quality criteria would have increased. For zinc, the degree of water quality increases decreased somewhat from our 2000 analyses. However, virtually all water quality samples in the injured surface water reaches still exceed the standards, often by a substantial degree. Use of the site specific criteria does not change any of our conclusions regarding the nature and extent of injury to surface water resources.

Restoration Project Costs

57. Debtor's expert Dr. Desvousges has argued that the costs of implementing the restoration alternatives in our analyses are too high. In developing his analyses, Dr. Desvousges has made a number of errors in representing the costs of restoration which result in his presenting incorrectly low restoration values.

58. The restoration costs we used in our damage calculations were developed by Mr. Greg Koonce of Interfluve, Inc. Mr. Koonce is a restoration ecologist who is an expert in the design and implementation of resource restoration projects, having conducted many such projects throughout the western U.S. Mr. Koonce's restoration costs are developed through a series of specifications designed to achieve the resource benefits incorporated into our HEA calculations.

59. The errors made by Dr. Desvousges that lead to his conclusions that our costs were too high include:

- Incorrect comparisons of projects in Lipton et al. (2004a) and LeJeune et al. (2004) with similar names but different restoration elements

- Selective omission of necessary project elements identified in Lipton et al. (2004a) and LeJeune et al. (2004)
- Misinterpretation of costing information in other published sources (DOI, 2007 and Bair, 2000).

Incorrect Comparison of Projects

60. Dr. Desvousges claims that project costs in the Aquatics Injury Report relied on in Lipton et al. (2004a) are inflated relative to costs for the same project in LeJeune et al. (2004). Dr. Desvousges, however, incorrectly compares project costs from the Aquatics Injury Report and LeJeune et al. (2004). The two reports describe projects with similar titles, but the elements of the similarly named projects differ depending on whether the project is designed primarily to benefit aquatic resources (the Aquatics Injury Report) or riparian resources (LeJeune et al., 2004).

61. For example, "road removal" is proposed in both reports, and Dr. Desvousges complains that: *The cost for roadway and railroad bed relocation is $1.1 million per mile in the Lipton Assessment (Aquatics report) but $0.323 million per mile in the Federal Lands report excluding the contingency costs. (p. 9 of 18)*[e]

[e] Dr. Desvousges calculation of a cost of $323,000 per mile for the road removal in LeJeune et al. (2004) is itself inaccurate. The presented information totals $462,000 per mile with included contingency costs. Dr. Desvousges inexplicably removed the contingency costs ($107,000 per mile), which would have resulted in a cost per mile of $355,000. It is not clear how he arrived at $323,00 per mile.

62. Despite the similar titles that were assigned to these project types, the restoration actions and outcomes are quite different. To benefit aquatic resources, the road removal is focused on roads adjacent to streams. To benefit riparian resources, the road removal targets roads in floodplains, but not necessarily adjacent to streams. When a road adjacent to a stream is removed, it is necessary to revegetate the footprint to prevent erosion and siltation of the aquatic habitat. In addition, large woody debris is placed to ensure that the stream does not erode into the newly disturbed footprint. As I noted in the Aquatics Injury Report: "Care must be exercised in reestablishing hydraulic connection of back channels and high flow channels to ensure that proper grades and cross sectional shapes are constructed. The bare ground of the removed roadway can act as a pathway for avulsion, and steps to offset the relative hydraulic smoothness of the removed fill must be taken. These steps typically include planting of containerized trees and shrubs and placing large woody debris (LWD) in the cleared area." Therefore, my Aquatics Injury Report included costs for revegetation, which includes costs for trees, shrubs, seeding, large woody debris placement, soil amendments, and erosion control. As I noted above, these specifications were developed by Mr. Koonce, who is a practicing expert in the field of restoration and who has completed many similar projects throughout the western U.S.

63. When a road more distant from a stream is removed, if the surrounding vegetation is healthy and dense, restoration ecologists often allow the surrounding vegetation to encroach and stabilize the newly exposed soil if the setting is conducive to such natural regeneration. Because the proposed projects would occur within the National Forest, we concluded that it was unnecessary to include revegetation as a project component in this instance. As described in LeJeune et al. (2004, p. 4-12): "The objective of this restoration project type is to remove obsolete roads and railways from the riparian zone and create conditions that encourage natural

revegetation of the riparian habitat… The adjacent vegetation will provide protection from desiccation; a ready source of seeds, propagules, and vectors of seed dispersal (e.g., birds, small mammals); and a source of soil biota to colonize the disturbed area. Therefore, vegetation recovery is expected to begin naturally and rapidly after project implementation."

64. The differences in essential elements of successful projects in different environments leads to the differences in unit costs of road removal that Dr. Desvousges noted. This is an example of a misunderstanding of the components necessary in two very different ecological environments.

65. A second example of Dr. Desvousges' misunderstanding of essential differences in project types is apparent in his incorrect comparison of the cost of restoring mainstem bank structures: *The cost of restoring mainstem bank structures is $4.6 million per mile in the Aquatics report and $0.854 million per mile in the Federal Lands report.*

66. Because of differences in the scope and goal of these projects presented in the two reports, the cost estimates are incomparable. The Sherlock Creek project that Dr. Desvousges references does not include costs for the following activities: site preparation, dewatering, design, permitting, monitoring and maintenance, and revegetation. Therefore the comparison is reflecting an incomplete summary of the required actions.

67. This comparison also is invalid because the mainstem bank structure work in our damage calculations is designed to restore large channel waterways. To develop cost comparisons on a linear basis between large rivers and Sherlock Creek (a small to medium size stream with an approximately 20 ft channel width) is improper.

Incomplete Comparisons and Omission of Critical Project Elements

68. Dr. Desvousges makes numerous errors in cost comparisons because he selects line items from a cost table but fails to include other necessary components of the project design. For example:

- Dr. Desvousges selectively removed contingency costs from the total for the road removal project presented in LeJeune et al. (2004) in his comparison of road removal costs included in the Aquatics Injury Report. He provides no justification for this adjustment. Indeed, such an adjustment is inappropriate given the widespread acceptance of specifically addressing contingencies in developing preliminary project cost estimates (e.g., see U.S. Army Corps of Engineers and U.S. EPA, 2000).

- Dr. Desvousges inaccurately and incorrectly compared replanting costs in the Aquatics Injury Report and in LeJeune et al. (2004) by selectively reporting partial replanting costs from the Aquatics Injury Report. He compares costs of $131,000/ac in LeJeune et al. (2004) and $43,500 per acre (= $1 per square foot) used in the Aquatics Injury Report. A correct presentation would have shown that the unit costs associated with revegetating riparian habitat in both reports are identical. The specific line items and the comparison of the revegetation costs from the two reports are shown in Table 5 below.

Table 5. Comparison of revegetation unit costs from Federal Lands and aquatics damage calculations

Revegetation cost line item	Value in Lipton et al. *Aquatics* report ($2004)	Value in LeJeune et al. *Federal Lands* report ($2004)
Soil amendment	$\$0.25/ft^2$	$\$0.25/ft^2$
Trees/shrub/seeds	$\$1.00/ft^2$	$\$1.00/ft^2$
Large woody debris	$450/piece	$450/piece
Construction mobilization and demobilization	3% of construction costs	3% of construction costs
Design	20% of construction costs	10% of construction costs
Contingency	40% of construction costs	40% of construction costs

69. Dr. Desvousges selected the $\$1.00/ft^2$ line item cost from the *Aquatics* report and used it as the only element to build a comparable cost per acre of riparian vegetation from the *Aquatics* report. Specifically, he omitted related costs for soil amendments, placement of large woody debris, construction mobilization-demobilization, design, and contingency costs. The result is that dissimilar projects are being compared, and his estimate represents a cost for an effort that would be entirely inadequate to complete the necessary revegetation and restore environmental functions. Thus, by leaving out specific and critical elements of the proposed revegetation project in the Aquatics Injury Report, Dr. Desvousges' comparisons are invalid.

Misinterpretation of other published cost estimates

70. The examples above illustrate Dr. Desvousges misrepresentation of the information provided in the Trustees' damage calculations. He goes further to misrepresent information presented in other ecological restoration plans. For example, Dr. Desvousges misrepresents reforestation costs presented in Bair (2000), and misrepresents costs and restoration objectives presented in DOI (2007).

71. Bair (2000) (not Briar 2000, as incorrectly cited by Dr. Desvousges) discussed reforestation costs of $110/acre. This estimate by Bair did not include costs associated with the

planning, labor, equipment, and supplies actually required to complete a riparian reforestation project. Evidence of this is provided in the detailed line item tables for restoration projects that are presented in Tables 1 and 2 of the study (Bair, 2000 see pages 109-111). In addition to the line item “Planting” at $110 per acre to which Dr. Desvousges refers, Bair (2000) also includes the following items that are essential to the restoration projects he described (Bair, 2000, Table 2, pages 110-111).

- Plan, design, NEPA
- Excavator
- Dozer
- Riparian thinning
- Labor crew
- Helicopter
- Log Haul
- Move in/out
- Materials
- Rig.

72. Clearly, $110 per acre for planting is a fraction of the cost of revegetation projects. Furthermore, since Bair summarized actual costs of completed projects, he had no need to include contingency costs. This is a cost element that all contractors should include when preparing estimates of future project costs (e.g., see U.S. Army Corps of Engineers and U.S. EPA, 2000). Indeed, in discussions with Brian Bair of the U.S. Forest Service, we confirmed that the $110/acre was not a complete cost and was not a representative cost for

replanting. Among other things, Mr. Bair mentioned that the referenced $110 reflected the average cost for plantings when:

- Seedlings at cost from an existing local U.S. Forest Service nursery were available, and

- Low-cost prison crew labor was available to complete the planting.

73. Dr. Desvousges calculates several unit costs based on information presented in DOI (2007), which is the Trustees' Final Interim Basin Restoration Plan (FIRP). Dr. Desvousges compares his calculated values with unit costs presented in the Aquatics Injury Report and LeJeune et al. (2004) and concludes based on his comparison that the costs in the Aquatics Injury Report and LeJeune et al. (2004) are inflated. The comparison is wholly invalid, since it is clearly stated repeatedly in DOI 2007 that purpose of the FIRP is to identify a set of compensatory restoration projects that:

> "1) would partially address natural resource injuries caused by mining activities in the Coeur d'Alene Basin;
>
> 2) could be implemented within the next several years; and
>
> 3) would use, but not exceed, funds available to the Trustees'." (DOI, 2007, p.5)

74. The projects presented in the FIRP were not intended to restore baseline conditions or to fully compensate for losses of services caused by the injuries. The projects presented in the FIRP were initially bounded by funds already available to the Trustees from previous settlements. The FIRP clearly states that the costs presented for the selected projects account for

only a portion of anticipated total project costs. Thus, Dr. Desvousges incorrectly compares projects with fundamentally difference scopes and goals. For example:

- LeJeune et al. (2004) describes a cost of $221,000 per acre for placer mine rehabilitation. The FIRP (DOI, 2007) proposes restoring the 20-acre Sherlock Creek Placer Mine site for $950,000 ($47,000 per acre) (p. 14 of 18). The FIRP describes a project that is bounded by available funding. The $950,000 the FIRP references for funding restoration work at the Sherlock Creek Placer Mine is a portion of the funding required for a complete restoration. Among the elements this funding does not account for, but that are essential to the project, are expenses for design and engineering, permitting, and monitoring and maintenance (personal communication, Jeff Johnson, U.S. Forest Service).
- Dr. Desvousges' estimate of revegetation costs at $5,790 per acre based on costs presented for work on Benewah Creek in DOI (2007) is incomparable to the revegetation costs presented in the Aquatics Injury Report. Desvousges argues that the project funding allocation for Benewah Creek in DOI (2007) represents the total amount required to acquire habitat, evaluate the stream channel habitat quality, reconstruct the stream channel, install grade control structures, and revegetate 1,114 acres (see DOI, 2007 p. 24). DOI (2007) clearly states, however, that the funding will only partially address some of these items: "This project would accomplish a portion of these activities, beginning with acquiring high priority habitat and designing improvements." (DOI, 2007 p. 24)

75. Clearly the FIRP funding does not cover all the restoration activities and, critically, it does not intend to address the total costs associated with the envisioned revegetation effort. As a

result, the estimate of per-acre revegetation costs that Dr. Desvousges calculates are inaccurate, irrelevant, and have no link to actual revegetation work.

- Dr. Desvousges cites a proposed restoration project costs on Pine Creek of $600,000 (or $44,000 per stream mile) as a representative restoration cost. As clearly stated in DOI (2007), $600,000 would not fully fund all restoration actions required to restore the 13.6 targeted miles of targeted stream reaches the document identifies (see page 20 in DOI, 2007): "The Pine Creek restoration actions that are part of the FIRP preferred alternative would not complete all the restoration that is needed in Pine Creek. Rather, this project would provide part of the funding that would be required to complete restoration and monitoring of Pine Creek." (page 20 in DOI, 2007)

76. Using the cost for the Pine Creek project described in the FIRP to calculate an average price per mile for the restoration projects described in the Aquatics Injury Report is an invalid approach. The project goals and scopes are fundamentally different. This conclusion was confirmed in discussions with the primary author of the report, Kathleen Moynan of the U.S. Fish and Wildlife Service. Ms. Moynan emphasized that, as stated in the report's introduction, the goal of the report was to identify projects consistent with meeting the Trustees' identified restoration objectives and to allocate existing settlement funding to begin work on these projects. As a result, the referenced project costs only account for expenditures the trustees would make at this time and do not reflect cost for meeting all defined project objectives.

Baseline Issues

77. Dr. Desvousges claims that LeJeune et al. (2004) did not use a proper baseline and that the baseline information presented in Stratus Consulting (2000) was not used in calculating the damages. Both assertions are incorrect.

78. The baseline conditions described in Stratus Consulting (2000) clearly showed a range of vegetation cover, structure, and species composition in appropriately selected reference areas. As noted Stratus Consulting (2000), the baseline data represent a range of anthropogenic disturbance and a range of natural variability. We described baseline as a range of values from the 25th to 75th percentile of cover, composition, and structure values measured at reference sites. For tree canopy, for example, the baseline cover ranged from 11% to 48%. For shrubs, the baseline cover ranged from 42% to 80%. Clearly there were trees present under baseline conditions.

79. Reference area conditions that we measured were comparable to published riparian vegetation community descriptions and represent a normal range of conditions [43 CFR 11.72(d)(6)]. For example, in Spion Kop Research Natural Area (RNA) at the confluence of Teepe Creek and the North Fork Coeur d'Alene River, floodplain vegetation consists black cottonwood of varying age classes, interspersed with wetland communities occupying old river channels and grass/forb communities occupying dry river terraces (Moseley and Bursik, 1994). Habitat surveys along Clark Fork River between Thompson Falls, Montana, and the mouth of the river at Lake Pend Oreille in 1993 and 1994 (Northrop, Devine & Tarbell, 1994; Washington Water Power, 1995) showed that the dominant riparian species included black cottonwood and quaking aspen in the tree canopy, and thinleaf alder, common snowberry, western serviceberry, black hawthorn, red-osier dogwood, and willow species in the shrub midstory. A road and

railroad parallel the river throughout the length surveyed. Riparian zones of Rock Creek, the Bighole River, the Ruby River, and Bison Creek, all in southwest Montana, were surveyed by Boggs (1991). Each of these locations is subjected to agricultural uses and grazing, and each is bordered by a highway or interstate. The Big Hole River is also bordered by a railroad. Riparian zones along these streams supported an average of 60% herbaceous cover, 44% shrub cover, and 18% tree cover (Boggs, 1991).

80. Clearly, we did not use the historical, pristine riparian vegetation, which included large western red cedar, white pine, larch, and cottonwood (Idaho Panhandle National Forests, 1998), as a representation of baseline conditions. Mature riparian forest has been greatly reduced or eliminated along much of the riparian zones of the basin as a result of logging, road construction, agriculture, urban development, and mining (Idaho Panhandle National Forests, 1998). We explicitly considered this in our selection of reference areas (see Stratus Consulting, 2000).

81. The baseline conditions used in the LeJeune et al. (2004) calculation of damages were the conditions reported in Stratus Consulting (2000). As we stated in our description of active revegetation:

> Active restoration of the vegetation would include removal of existing undesirable vegetation and planting of a wide range of species in patterns resembling a natural and complex distribution of vegetation types. The revegetation plan would target reference area species composition and community patterns to reflect the natural mosaic created by repeated floods of varying magnitude.
>
> Revegetation would include seeding of herbaceous species and planting of shrubs and trees.

The ecological recovery trajectory for this project type is based on the time required to attain the maturity of vegetation and mosaic of vegetation composition and structure present in the reference areas on the Little North Fork Coeur d'Alene River, upper Ninemile Creek, and upper Canyon Creek. As described above, restoration actions will hasten the recovery of a structurally and compositionally diverse riparian habitat that provides full services. For modeling purposes, the services provided by the riparian community increase linearly from no services to full services (baseline conditions) as the vegetation community gradually matures. We used 40 years as an estimate of the time required for the maturation of a black cottonwood community to a stage at which black cottonwood trees dominate the canopy; provide shade, hiding, and nesting cover for wildlife; provide mature tree boles (trunks) for cavity-nesting birds; and begin to drop large branches that supply large woody debris to enhance the structural heterogeneity of the floodplain.

F. Summary of Damages

82. Based on the above analyses, I conclude that natural damages are at least $333 million, based on updating our original analyses to 2008$. If one calculates damages assuming implementation of the comprehensive remedy, damages are approximately $352 million. If these values are further updated to take into consideration our recent fish sampling in Canyon Creek, damages range from $358 to $368 million.

G. References Cited in Text

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H. Exhibits to be Introduced in Support of Direct Testimony

Exhibits

USCdA068 Expert Report of Joshua Lipton, (8/10/07)

USCdA069 Report of Injury Assessment and Injury Determination

USCdA070 Declaration of Dr. Joshua Lipton

USCdA071 Phase I Rebuttal Expert Report of Joshua Lipton and Katherine LeJeune

USCdA072 Phase 2 Expert Report of Katherine LeJeune, et al. (Federal Lands)

USCdA073 Phase 2 Expert Report of Joshua Lipton, et al. (Aquatic Resources)

USCdA074 Phase 2 Expert Report of Joshua Lipton, et al. (Summary Calculations)

USCdA075 Phase 2 Rebuttal Report of Joshua Lipton

USCdA076 Phase 2 Supplemental Expert Report of Joshua Lipton, et al (Federal Lands)

USCdA077 Phase 2 Expert Report of Callie Ridolfi

USCdA078 Deposition Transcript of Joshua Lipton (09/07/07)

USCdA079 Stratus NRD Calculations for Coeur d'Alene Site

USCdA080 Phase 1 Expert Report of Dudley W. Reiser

USCdA081 Phase 1 Expert Report of Daniel F. Woodward

USCdA082 Phase 1 Expert Report of D. George Dixon

USCdA083 Phase 1 Expert Report of Frank J. Rahel

USCdA084 Phase 1 Rebuttal Expert Report of Frank J. Rahel

USCdA085 Photos demonstrating Coeur d'Alene Basin conditions

USCdA087 Stratus Fish Sampling Data – Canyon Creek (2007)

USCdA088 Graphs of Exceedences of Idaho Site Specific Standards

USCdA090 Affidavit of Jeff Johnson, USDA-FS

USCdA091 Affidavit of David Fortier, BLM

Demonstratives

Demonstrative – Table showing multi-year average fish population data

Demonstrative – Maps of Coeur d'Alene Basin

Demonstrative – PowerPoint slides illustrating viability of easements

Demonstrative – Photos showing private lands along North Fork Coeur d'Alene River

Demonstrative – Graphs from USCdA069 showing fish population data

Demonstrative – Summary table showing natural resource damage calculations

Demonstrative – Table of Peer Reviewed Publications, Coeur d'Alene Basin NRDA

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct. Executed this 2nd day of October, 2007 at Boulder, Colorado.

Joshua Lipton